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ABSTRACT

The Comprehensive School Mathematics Program (CSMP) is a program of CEMREL, Inc., one of the national educational laboratories, and was funded by the National Institute of Education (NIE). Its major purpose is the development of curriculum materials for grades kindergarten through 6. This volume describes non-test data collected in spring 1980 from CSMP and non-CSMP fifth-grade classes, and includes implementation data as well as teacher and student attitudes. An attempt is made to compare CSMP with non-CSMP groups on these variables. Among the results, it is noted that pupils in CSMP classes liked mathematics less, when compared with other subjects, than non-CSMP classes did, but saw mathematics as more open. Further, CSMP classes liked mathematics more when: 1) teachers gave a higher overall evaluation to the curriculum; 2) supplementing occurred more often; 3) fewer tests were reported by students; and 4) fewer games were reported by students. The non-CSMP classes tended to like mathematics less under these conditions. (MP)

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# EXTENDED PILOT TRIALS OF THE COMPREHENSIVE SCHOOL MATHEMATICS PROGRAM:

## EVALUATION REPORT SERIES

# Evaluation Report 7-B-3

# Fifth Grade Evaluation: Volume III, Non-Test Data

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# Extended Pilot Trial of the Comprehensive School Mathematics Program

Evaluation Report 7-B-3

Fifth Grade Evaluation: Volume III, Non-Test Data

Martin Herbert
Ava Small

December, 1980

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## Description of Evaluation Report Series

The Comprehensive School Mathematics Program (CSMP) is a program of CEMREL, Inc., one of the national educational laboratories, and is funded by the National Institute of Education. Its major purpose is the development of curriculum materials for grades K-6.

Beginning in September, 1973, CSMP began an extended pilot trial of its Elementary Program. The pilot trial is longitudinal in nature; students who began using CSMP materials in kindergarten or first grade in 1973-74, were able to use them in first and second grades respectively in 1974-75, and so on in subsequent years. Hence the adjective "extended".

The evaluation of the program in this extended pilot trial is intended to be reasonably comprehensive and to supply information desired by a wide variety of audiences. For that reason the reports in this series are reasonably non-technical and do not attempt to widely explore some of the related issues. The list of reports through year six is given on the next page. The following reports are planned for year 7:

7-B-1 - Fifth Grade Evaluation: Volume I, Summary
7-B-2 - Fifth Grade Evaluation: Volume II, Test Data
7-B-3 - Fifth Grade Evaluation: Volume III, Non-Test Data
7-B-4 - Re-evaluation of Second Grade, Revised MANS Tests
7-B-5 - Achievement of Former CSMP Students at Fourth Grade
7-B-6 - Student Achievement, Rapid Implementation Model

Extended Pilot Trials of the
Comprehensive School Mathematics Program

## Evaluation Report Series

| | |
|---|---|
| Evaluation Report 1-A-1 | Overview, Design and Instrumentation |
| Evaluation Report 1-A-2 | External Review of CSMP Materials |
| Evaluation Report 1-A-3 | Final Summary Report Year 1 |
| Evaluation Report 1-B-1 | Mid-Year Test Data: CSMP First Grade Content |
| Evaluation Report 1-B-2 | End-of-Year Test Data: CSMP First Grade Content |
| Evaluation Report 1-B-3 | End-of-Year Test Data: Standard First Grade Content |
| Evaluation Report 1-B-4 | End-of-Year Test Data: CSMP Kindergarten Content |
| Evaluation Report 1-B-5 | Test Data on Some General Cognitive Skills |
| Evaluation Report 1-B-6 | Summary Test Data: Detroit Schools |
| Evaluation Report 1-C-1 | Teacher Training Report |
| Evaluation Report 1-C-2 | Observations of CSMP First Grade Classes |
| Evaluation Report 1-C-3 | Mid-Year Data from Teacher Questionnaires |
| Evaluation Report 1-C-4 | End-of-Year Data from Teacher Questionnaires |
| Evaluation Report 1-C-5 | Interviews with CSMP Kindergarten Teachers |
| Evaluation Report 1-C-6 | Analysis of Teacher Logs |
| Evaluation Report 2-A-1 | Final Summary Report Year 2 |
| Evaluation Report 2-B-1 | Second Grade Test Data |
| Evaluation Report 2-B-2 | Readministration of First Grade Test Items |
| Evaluation Report 2-B-3 | Student Interviews |
| Evaluation Report 2-C-1 | Teacher Questionnaire Data |
| Evaluation Report 2-C-2 | Teacher Interviews, Second Grade |
| Evaluation Report 2-C-3 | Teacher Interviews, First Grade |
| Evaluation Report 3-B-1 | Second and Third Grade Test Data Year 3 |
| Evaluation Report 3-C-1 | Teacher Questionnaire Data Year 3 |
| Evaluation Report 4-A-1 | Final Summary Report Year 4 |
| Evaluation Report 4-B-1 | Standardized Test Data, Third Grade |
| Evaluation Report 4-B-2 | Mathematics Applied to Novel Situations (MANS) Test Data |
| Evaluation Report 4-B-3 | Individually Administered Problems, Third Grade |
| Evaluation Report 4-C-1 | Teacher Questionnaire Data, Third Grade |
| Evaluation Report 5-B-1 | Fourth Grade MANS Test Data |
| Evaluation Report 5-B-2 | Individually Administered Problems, Fourth Grade |
| Evaluation Report 5-C-1 | Teacher Questionnaire and Interview Data, Fourth Grade |
| Evaluation Report 6-B-1 | Comparative Test Data: Fourth Grade |
| Evaluation Report 6-B-2 | Preliminary Test Data: Fifth Grade |
| Evaluation Report 6-C-1 | Teacher Questionnaire Data: Grades 3-5 |

## Key to Indexing

Evaluation Reports are labelled m-X-n,

where m is the year of the pilot study, with 1973-74 as Year 1.
X is the type of data being reported where A is for overviews and summaries, B is for student outcomes and C is for other data.
n is the number within a given year and type of data.

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## INTRODUCTION TO VOLUME III

In the spring of 1980, a series of mathematics tests was administered to 31 fifth grade classes using the Comprehensive School Mathematics Program and to 25 comparison classes using more traditional programs. The results of this testing are described in Volume II (Evaluation Report 7-B-2).

This is Volume III of the report, and it describes non-test data collected from these classes including: implementation data, teacher attitudes and student attitudes. An attempt has been made to compare CSMP classes with Non-CSMP classes on these non-test variables, and to relate these findings with the test results described in Volume II.

No summary of the results is given in this volume. However, Volume I (Evaluation Report 7-B-1) consists of a brief summary of both Volume II and Volume III.

# IMPLEMENTATION

## A. Teacher Responses

This section summarizes responses to questions dealing mainly with implementation of the program and teacher experience and training. The responses are from, usually, 30 CSMP teachers and 23 non-CSMP teachers. The data are presented without comment until the end of Section A, where a short summary is presented.

Numbers given represent percentages responding in the indicated manner (first entry, CSMP teachers; second entry, comparison teachers).

### 1. Teacher Experience

| | CSMP | Non-CSMP | Experience teaching CSMP |
|---|---|---|---|
| First year | 7% | 4% | 39% |
| 2-5 years | 21% | 26% | 61% |
| 6-10 years | 31% | 22% | |
| More than 10 years | 41% | 48% | |

At what grade levels have you taught math (and CSMP):

| | Math Experience | | |
|---|---|---|---|
| | CSMP | Non-CSMP | CSMP Experience |
| Just 5th grade | 21% | 9% | 75% |
| 5th grade plus lower grades | 48% | 43% | 25% |
| 5th grade plus higher grades | 7% | 9% | |
| 5th grade plus lower and higher grades | 24% | 39% | |

On the average, how much time does your class spend on math each day?

| | CSMP | NON-CSMP |
|---|---|---|
| Less than 45 minutes | 0% | 5% |
| 45-50 minutes | 14% | 45% |
| 51-59 minutes | 11% | 9% |
| 60 minutes | 64% | 32% |
| > 60 minutes | 11% | 9% |
| Mean Number of minutes | 59 minutes | 53 minutes |

About what percent of this time is spent on:

Teacher-led work?
Small group work?
Individual work?

| | CSMP | NON-CSMP |
|---|---|---|
| Teacher-led work | 59% | 43% |
| Individual work | 25% | 36% |
| Small group work | 16% | 21% |

(Responses may also be categorized as follows:)

| | CSMP | NON-CSMP |
|---|---|---|
| Majority teacher-led work plus some individual | 34% | 9% |
| Majority teacher-led work plus some individual plus some small group | 31% | 13% |
| Evenly distributed between teacher-led plus small group | 7% | 4% |
| Evenly distributed between teacher-led plus individual | 7% | 9% |
| Evenly distributed among three categories | 10% | 39% |
| Majority individual work plus some teacher-led | 0% | 22% |
| Other or no response | 10% | 4% |

2. Teacher Preparation

How would you rate the time required for daily preparation for your present math text or math program compared to previous math programs you have used:*

| | CSMP | NON-CSMP |
|---|---|---|
| less | 13% | 8% |
| about the same | 13% | 50% |
| more at first but about the same after a year's experience | 42% | 17% |
| more at first and continues to be after a year's experience | 33% | 25% |

* 24 CSMP teachers and 12 NON-CSMP teachers responded.

3. Supplementing

Do you supplement your regular math program with additional activities?

| | CSMP | NON-CSMP |
|---|---|---|
| YES | 90% | 96% |
| NO | 10% | 4% |

If so, what topics do you cover?
(Responses sum to more than 100% because of multiple responses.)

| | CSMP | NON-CSMP |
|---|---|---|
| long division algorithm | 41% | 5% |
| multiplication algorithm | 28% | 5% |
| basic number facts/ mental arithmetic | 22% | 38% |
| multiplication facts | 16% | 5% |
| word problems | 25% | 10% |
| familiarity with fractions | 25% | 0% |
| operations with fractions | 16% | 14% |
| decimals | 19% | 0% |
| metrics or measurement | 3% | 24% |
| geometry | 9% | 0% |
| averaging | 3% | 5% |
| uses (another) traditional text | 16% | 10% |
| money | 0% | 19% |
| time | 0% | 10% |
| graphs | 0% | 10% |
| enrichment exercises | 0% | 10% |
| estimation | 0% | 5% |

Is this supplementing usually for: *

| | CSMP | NON-CSMP |
|---|---|---|
| a few minutes | 54% | 32% |
| a full math period | 31% | 32% |
| several consecutive math periods | 31% | 47% |

* Percentages do not sum to 100, since multiple responses were possible

Does it usually occur:

| | CSMP | NON-CSMP |
|---|---|---|
| daily | 12% | 25% |
| two to four times a week | 24% | 15% |
| weekly | 20% | 20% |
| two to three times a month | 32% | 10% |
| monthly | 12% | 10% |
| once a year | 0% | 15% |
| other | 0% | 5% |

Over the course of the year, about what percent of the math time is used for this supplemental work?

| | CSMP | NON-CSMP |
|---|---|---|
| None | 10% | 4% |
| Less than 10% | 28% | 26% |
| 10-19% | 10% | 13% |
| 20-29% | 28% | 22% |
| 30-39% | 10% | 4% |
| 40-49% | 3% | 4% |
| 50-59% | 3% | 0% |
| ≥60 | 10% | 9% |
| Did not respond | 3% | 13% |
| Mean % of time | 25% | 23% |

4. Special Arrangements for Low Ability Students

Does your school provide any special arrangements for your low ability students? If yes, please specify (Title I, teacher aides, etc.)

| | CSMP | NON-CSMP |
|---|---|---|
| No | 37% | 42% |
| Title I | 13% | 8% |
| Special Services Teacher | 20% | 13% |
| Resource Teacher | 7% | 16% |
| Teacher's aide | 10% | 13% |
| Learning Center | 14% | 0% |
| Title VII | 0% | 8% |

5. Lessons Skipped or Omitted

Are there any lessons in your text which you skipped or omitted?

| | CSMP | NON-CSMP |
|---|---|---|
| No | 24% | 19% |
| Did not respond | 0% | 10% |
| Yes | 76%* | 71%** |

* Those teachers who went on to describe which lessons they omitted, mentioned lessons in geometry most frequently.

** These were rather evenly distributed among geometry lessons, enrichment activities/games, extra practice or review pages and the last 2-3 chapters (generally covering the topics of measurement, decimals and fractions).

6. Questions Specific to CSMP Teachers

By the end of the school year, how far do you expect to get in the numerical strand?*

| | CSMP |
|---|---|
| 96-100% completed | 63% |
| 83-95% completed | 10% |
| 72-80% completed | 7% |
| 50% or less completed | 17%** |
| Did not respond | 3% |

*For eight teachers, the 5th grade program consisted of Parts II & III instead of Parts III & IV (i.e., they are one semester behind). The percent of schedule completed was based on the actual program being used (Parts II & III or Parts III & IV).

**These were mainly from teachers in a school district which had decided that students would be using a traditional text next year.

About how many hours of teacher-training did you receive before you started to teach CSMP? (Note: the prescribed amount is 40 hours.)

| | |
|---|---|
| None | 4% |
| < 10 hours | 33% |
| 10-15 hours | 4% |
| 24 hours | 4% |
| 1 CEMREL workshop (about 40 hours) | 38% |
| ≥ 2 CEMREL workshops | 8% |
| CEMREL workshop plus other | 8% |

Who conducted the training?

| | |
|---|---|
| CEMREL | 56% |
| Coordinator | 22% |
| Other Teacher | 12% |
| Other | 3% |

About how many hours of training did you receive <u>after</u> you started to teach CSMP?

| | |
|---|---|
| None | 81% |
| < 10 hours | 14% |
| 20-30 hours | 5% |

Do you have any suggestions for improving the teacher training for CSMP?

| | |
|---|---|
| No, favorable | 16% |
| Yes, more time needed | 7% |
| Yes, it moved too quickly | 7% |
| Other/Not applicable | 13% |
| No response | 57% |

7. Questions Specific to Non-CSMP Teachers

What math text or program are you using this year?

| | |
|---|---|
| Mathematics Around Us (Scott Foresman) | 35% |
| Heath Elementary Mathematics (D.C. Heath) | 17% |
| School Mathematics--Concepts and Skills (Houghton-Mifflin) | 30% |
| Elementary School Mathematics (Addison Wesley) | 13% |
| Modern School Mathematics (Addison Wesley) | 9% |
| Mathematics for Individual Achievement (Houghton-Mifflin) | 4% |
| SRA Learning System Text (SRA) | 4% |
| Discovery in Mathematics (Robert Davis) | 4% |

(Five teachers reported the use of more than one text.)

COMMENTS: The majority of these texts are quite traditional in their approach. Thus, when responding to questions in the questionnaire, roughly 90% of the Non-CSMP teachers' answers are in regard to a "traditional" text.

8. Summary

In summarizing the manner in which CSMP and Non-CSMP teachers implemented their math programs, the following observations may be made:

1) CSMP teachers report more time spent on math (mean number of minutes per day = 59 versus 53).

2) CSMP teachers reported more time spent on teacher-led work (mean percent of time = 59% versus 43%) as opposed to small group or individual work.

3) Both CSMP and non-CSMP teachers supplement their math programs about the same total amount of time, though CSMP teachers were more likely to do it a few minutes at a time rather than in a block of several periods. In terms of topics covered in supplementary materials, there are both similarities and differences.

a) Similarities:

basic number facts and mental arithmetic drills

b) Differences:

--CSMP teachers supplement more in the areas of:

multiplication algorithm
division algorithm
fractions
decimals

--Non-CSMP teachers supplement more in the areas of:

money
time
graphs
enrichment exercises

4) Only half the CSMP teachers received the prescribed number of hours of training and most received no follow-up training after beginning the program. However, most of the teachers completed or came close to completing the schedule of lessons.

5) The majority of texts used by the non-CSMP teachers can be classified as fairly typical of traditional elementary school math texts now in use in the vast majority of schools.

6) There was very little difference in the teaching experience of CSMP and non-CSMP teachers, the median being nearly 10 years.

B. Relationship of Implementation Variables to MANS Test Data

Two sets of implementation variables were created and mean scores derived for each class.

The first set of variables, Set A, derived from the teacher questionnaire and discussed in the previous section, consisted of the following items:

- percentage of time spent supplementing the curriculum
- length of daily math period
- number of hours of CSMP teacher training
- amount of progress in the CSMP curriculum
- number of years of teaching experience

The second set of variables, Set B, derived from student questionnaires and discussed in a later section, consisted of mean class scores for student-reported frequency of the following activities:

- played math games
- took math tests
- did math homework
- got individual help from their teacher

Correlation coefficients were calculated between and among these two sets of variables, and with ability of class, as measured by reading comprehension scores. Figure 1, below, shows all significant correlations ($r > .36$) across CSMP and across non-CSMP classes.

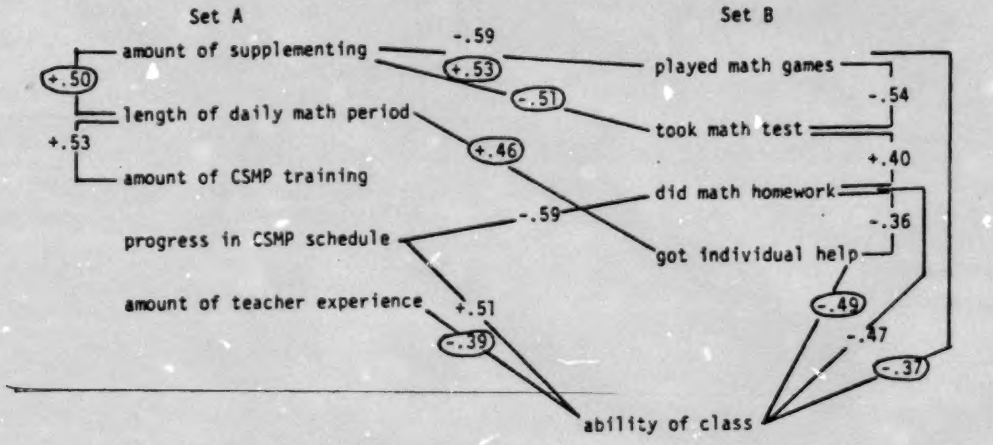



Fig. 1. Significant correlations among Implementation variables: plain entry for CSMP classes, circled entry for non-CSMP classes

The information in Figure 1 is rather difficult to assimilate, but three observations will be made:

a) For CSMP classes, higher ability classes tended to make more progress in the schedule and to do less homework, and these two variables were themselves related.

b) For non-CSMP classes there was a set of variables which were positively related to one another (though not always significantly) and all negatively related to the amount of testing in the class. This set consisted of the following variables:

- amount of supplementing
- length of math period
- played math games
- got individual help

c) For CSMP, amount of supplementing was negatively related to playing math games; for non-CSMP it was positively related. This agrees with the information that CSMP supplementation tended to focus on computation while non-CSMP supplementation was quite diversified.

Correlations were also calculated between these various implementation variables and certain MANS scales. Partial correlations were calculated, removing the effect of class ability level. Figure 2, below, shows the significant relationships that were found.

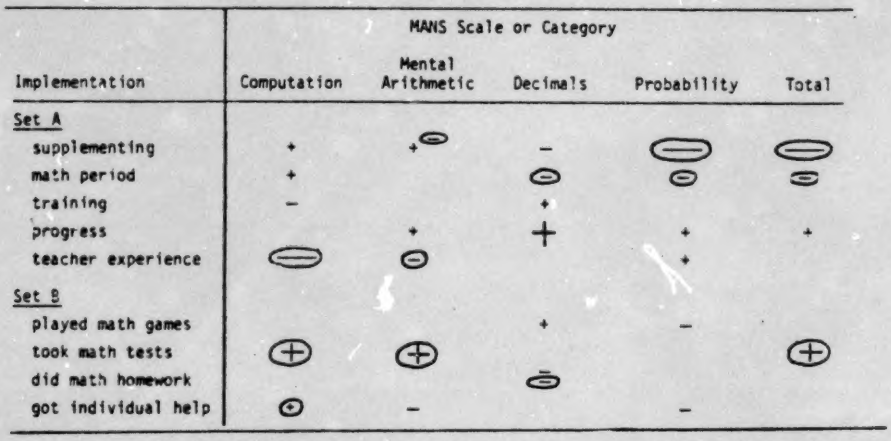



Fig. 2. Relationships between Implementation Variables and MANS Scores

Large symbols = significant correlation >.36
Small symbols = modest correlation (.20-.36)
plain = CSMP classes, circled = non-CSMP classes

[1]The partial correlation between two variables is the correlation between their "residuals" on a third variable, i.e. for each variable how much better or worse a class did than would have been predicted given the reading score of the class.

For CSMP classes (the plain symbols), there tended to be fewer significant correlations and the only implementation variable of note was progress in the schedule which was associated with higher MANS scores. As noted previously, progress was further with higher ability classes, but this effect on MANS scores is over and above that associated with differences in ability.

Furthermore, an analysis of the sign of the correlation coefficients (positive or negative) without regard to size reveals a consistent difference between computation scales - Computation, Mental Arithmetic and Fractions (not shown) - and two scales on content which CSMP emphasizes - decimals and probability. The following variables were associated with higher scores in the computation kinds of scales and lower scores on the other two scales:

- more supplementation
- more teacher experience
- more homework
- less CSMP training
- fewer math games

For non-CSMP classes, there was a set of variables (all positively interrelated) which tended to decrease MANS scores without affecting computation scores. This set consisted of:

- amount of supplementing
- length of math period
- getting individual help
- playing math games

Also in non-CSMP classes, frequency of testing (which is negatively related to the above variables) seemed to increase computation scores without affecting the other MANS scores.

## A. Teacher Responses

### 1. Math Anxiety

A great deal has been said recently about "math anxiety", "fear of mathematics", etc. Have you ever been "math anxious"?

| | CSMP | NON-CSMP |
|---|---|---|
| Never or hardly ever | 28% | 44% |
| Occasionally as a student but not as an adult | 28% | 26% |
| Still am once in a while | 38% | 26% |
| I am definitely a math anxious person | 0% | 4% |
| Did not respond | 7% | 0% |

2. Characteristics of Math Class

Below are several pairs of statements for your math class this year. Please circle the letter which best describes the relative balance or emphasis between the two.

A mean score ($\bar{X}$) was derived for each grade by assigning a score of 1 to a response of A,..., 5 to E and then taking the average. Thus, the higher the mean score, the more in agreement with the right-hand statement.

| | | A | B | C | D | E | $\bar{X}$ | |
|---|---|---|---|---|---|---|---|---|
| Achievement is oriented towards basic skills. | | | | | | | | Achievement is oriented towards more general progress. |
| | CSMP | 4% | 19% | 59% | 19% | 0% | 2.9 | |
| | NON-CSMP | 18% | 41% | 36% | 5% | 0% | 2.3 | |
| Lesson plans are followed in great detail. | | A | B | C | D | E | | Lesson plans serve only as a general guide. |
| | CSMP | 32 | 29 | 18 | 18 | 4 | 2.3 | |
| | NON-CSMP | 0 | 26 | 22 | 30 | 22 | 3.5 | |
| Lessons proceed briskly. | | A | B | C | D | E | | Lessons proceed thoroughly. |
| | CSMP | 4 | 7 | 48 | 19 | 22 | 3.5 | |
| | NON-CSMP | 0 | 14 | 27 | 27 | 32 | 3.8 | |
| Content of lessons is challenging for most students. | | A | B | C | D | E | | Content of lessons is easily mastered by most students. |
| | CSMP | 11 | 32 | 36 | 14 | 7 | 2.9 | |
| | NON-CSMP | 4 | 17 | 52 | 22 | 4 | 3.0 | |

| | | A | B | C | D | E | X | |
|---|---|---|---|---|---|---|---|---|
| Math class is one of my favorite times of the school day. | | | | | | | | Math class is one of my least favorite times of the school day. |
| | CSMP | 32 | 29 | 29 | 11 | 0 | 2.2 | |
| | NON-CSMP | 35 | 26 | 26 | 9 | 4 | 2.2 | |

| | | A | B | C | D | E | | |
|---|---|---|---|---|---|---|---|---|
| Math class has a business-like atmosphere. | | | | | | | | Math class has a fun atmosphere. |
| | CSMP | 0 | 11 | 68 | 14 | 7 | 3.2 | |
| | NON-CSMP | 4 | 30 | 57 | 9 | 0 | 2.7 | |

| | | A | B | C | D | E | | |
|---|---|---|---|---|---|---|---|---|
| Math class is Oriented toward solving specific problems. | | | | | | | | Math class is Oriented toward creative activities. |
| | CSMP | 4 | 32 | 39 | 18 | 7 | 2.9 | |
| | NON-CSMP | 4 | 61 | 26 | 9 | 0 | 2.4 | |

| | | A | B | C | D | E | | |
|---|---|---|---|---|---|---|---|---|
| Math is one of the harder subjects to teach. | | | | | | | | Math is one of the easier subjects to teach. |
| | CSMP | 7 | 14 | 43 | 25 | 11 | 3.2 | |
| | NON-CSMP | 0 | 9 | 22 | 43 | 26 | 3.9 | |

COMMENTS: Differences in mean response of .5 or greater are deserving of comment. Thus, it can be said that, in relation to non-CSMP teachers, there was a tendency for CSMP teachers to:

a) follow lesson plans in greater detail

b) see achievement as oriented towards more general progress

c) see math as one of the harder subjects to teach

d) see math as more oriented towards creative activities, and

e) think math class has more of a fun atmosphere.

3. Preferred Methods for Teaching Low Ability Students

Below are given pairs of statements. Please circle the letter which best describes what you think regarding math instruction for low ability students.

Best learning takes place in a group in which various ability levels are represented.

| | A | B | C | D | E | X̄ |
|---|---|---|---|---|---|---|
| CSMP | 23% | 12% | 15% | 38% | 12% | 3.0 |
| NON-CSMP | 9% | 14% | 14% | 50% | 14% | 2.9 |

Best learning takes place in a group in which all students are of the same ability.

It is important to concentrate on learning basic computational skills.

| | A | B | C | D | E | |
|---|---|---|---|---|---|---|
| CSMP | 26 | 26 | 30 | 15 | 4 | 2.4 |
| NON-CSMP | 9 | 55 | 23 | 0 | 14 | 2.5 |

It is important to provide exposure to a wide variety of topics in mathematics.

Best learning takes place in teacher-led situations.

| | A | B | C | D | E | |
|---|---|---|---|---|---|---|
| CSMP | 23 | 35 | 31 | 12 | 0 | 2.3 |
| NON-CSMP | 14 | 41 | 23 | 18 | 5 | 2.6 |

Best learning takes place when students are working individually.

It is better to touch lightly on a new topic several times.

| | A | B | C | D | E | |
|---|---|---|---|---|---|---|
| CSMP | 19 | 19 | 22 | 37 | 7 | 2.9 |
| NON-CSMP | 0 | 14 | 38 | 38 | 10 | 3.4 |

It is better to stick with a new topic until mastered.

Special instructional arrangements should be made for these students.

| | A | B | C | D | E | |
|---|---|---|---|---|---|---|
| CSMP | 28 | 36 | 28 | 8 | 0 | 2.2 |
| NON-CSMP | 27 | 45 | 14 | 9 | 5 | 2.2 |

The regular classroom provides an adequate instructional setting for these students.

| Manipulatives work best with these students | A | B | C | D | E | | Paper and pencil works best with these students. |
|---|---|---|---|---|---|---|---|
| CSMP | 19 | 42 | 35 | 4 | 0 | 2.2 | |
| NON-CSMP | 23 | 36 | 32 | 5 | 4 | 2.3 | |

| It is better to set goals that will insure success. | A | B | C | D | E | | It is better to set goals that are challenging. |
|---|---|---|---|---|---|---|---|
| CSMP | 19 | 35 | 42 | 4 | 0 | 2.3 | |
| NON-CSMP | 18 | 32 | 32 | 14 | 4 | 2.5 | |

| Best learning takes place when a teacher can give indivual help. | A | B | C | D | E | | Best learning takes place when a teacher can work with a small group. |
|---|---|---|---|---|---|---|---|
| CSMP | 23 | 31 | 27 | 15 | 4 | 2.5 | |
| NON-CSMP | 19 | 19 | 14 | 29 | 19 | 3.1 | |

COMMENTS: Both CSMP and non-CSMP teachers responded in a similar fashion to most of the statements. Differences as large as .5 can be seen in only two statements; CSMP teachers are more likely to say that best learning takes place when a teacher can work with a small group (versus "give individual help") and that it is better to touch lightly on a new topic several times (versus "stick with a new topic until it is mastered")

For three items CSMP teachers gave responses which, though similar to non-CSMP teachers were different from what might be called the "CSMP philosophy". Generally they agreed that: "it is better to set goals that will insure success" versus challenging; "special instructional arrangements should be made" versus regular classroom setting; and "concentrate on learning basic computational skills" versus wide variety of topics.

4. Comparisons with Previous Math Program

How would you rate your present math text or math program compared to previous math programs you have used on the following items? (Please omit this question if you have not taught fifth grade math with a different textbook or program.)*

b) Overall quality

| | (much lower) | (slightly lower) | (about the same) | (slightly higher) | (much higher) | $\bar{X}$ |
|---|---|---|---|---|---|---|
| CSMP | 0% | 14% | 19% | 14% | 52% | 4.0 |
| Non-CSMP | 8% | 0% | 25% | 33% | 33% | 3.8 |

c) Student interest and involvement

| | (far less) | (a little less) | (about the same) | (a little more) | (far more) | |
|---|---|---|---|---|---|---|
| CSMP | 0% | 17% | 17% | 17% | 50% | 4.0 |
| Non-CSMP | 8% | 0% | 58% | 8% | 25% | 3.4 |

d) Students' achievement in computational skills

| | (far less) | (a little less) | (about the same) | (a little more) | (far more) | |
|---|---|---|---|---|---|---|
| CSMP | 5% | 27% | 41% | 27% | 0% | 2.9 |
| Non-CSMP | 0% | 8% | 50% | 25% | 17% | 3.5 |

e) Students' achievement in mathematical concepts

| | (far less) | (a little less) | (about the same) | (a little more) | (far more) | |
|---|---|---|---|---|---|---|
| CSMP | 0% | 13% | 17% | 42% | 29% | 3.9 |
| Non-CSMP | 0% | 0% | 67% | 25% | 8% | 3.4 |

f) Students' ability to do logical reasoning

| | (far less) | (a little less) | (about the same) | (a little more) | (far more) | |
|---|---|---|---|---|---|---|
| CSMP | 0% | 4% | 0% | 26% | 70% | 4.6 |
| Non-CSMP | 0% | 33% | 42% | 25% | 0% | 2.9 |

*These questions were answered by approximately 24 CSMP teachers and 12 non-CSMP teachers, ie. between 1/2 and 3/4 of the teachers.

g) Students' facility in solving word problems

| | (far less) | (a little less) | (about the same) | (a little more) | (far more) | |
|---|---|---|---|---|---|---|
| CSMP | 4% | 21% | 33% | 21% | 21% | 3.3 |
| Non-CSMP | 0% | 17% | 66% | 17% | 0% | 3.0 |

h) Appropriateness for <u>low</u> ability students

| | (much lower) | (slightly lower) | (about the same) | (slightly higher) | (much higher) | |
|---|---|---|---|---|---|---|
| CSMP | 35% | 17% | 22% | 22% | 4% | 2.4 |
| Non-CSMP | 25% | 17% | 17% | 33% | 8% | 2.8 |

i) Appropriateness for <u>high</u> ability students

| | (much lower) | (slightly lower) | (about the same) | (slightly higher) | (much higher) | |
|---|---|---|---|---|---|---|
| CSMP | 0% | 4% | 4% | 17% | 75% | 4.6 |
| Non-CSMP | 0% | 8% | 25% | 33% | 33% | 3.9 |

COMMENTS: There were several differences of at least 0.5 between the responses of CSMP and non-CSMP teachers:

1) CSMP teachers gave a <u>higher</u> rating to:
   student interest and involvment (c)
   students' ability to do logical reasoning (f)
   appropriateness for high ability students (i)
   students' achievement in mathematical concepts (e)
2) CSMP teachers gave a <u>lower</u> rating to:
   students' achievement in computational skills (d)
3) CSMP teachers were much more variable in their responses. Across the 8 items, an average of about 44% of the non-CSMP teachers chose the middle response, as opposed to only about 20% of the CSMP teachers.

5. Content Not Adequately Covered in Math Program

Are there any skills or concepts that you think students should know by the end of fifth grade which are not adequately covered by your present math program?
(Check as many as apply.)*

| | CSMP | Non-CSMP |
|---|---|---|
| No | 11% | 4% |
| Omit | 3% | 26% |
| Yes: | (86%) | (70%) |
| basic number facts | 33% | 4% |
| place value | 20% | 17% |
| algorithm for whole number multiplication | 23% | 4% |
| algorithm for whole number division | 27% | 4% |
| operations with fractions | 57% | 13% |
| familiarity with fractions | 27% | 13% |
| operations with decimals | 33% | 13% |
| familiarity with decimals | 10% | 13% |
| mental arithmetic | 7% | 35% |
| estimation | 13% | 13% |
| word problems | 43% | 48% |
| geometry | 13% | 4% |
| probability | 3% | 13% |
| metrics or measurement | 7% | 8% |
| other | 9% | 4% |

*Percentages do not sum to 100, since multiple responses were possible.

COMMENTS: 86% of the CSMP teachers versus 70% of the non-CSMP teachers indicated that there were some skills or concepts that their math program did not adequately cover during the year. In addition, CSMP teachers checked a greater number of items (mean number CSMP = 3.2; non-CSMP = 1.7). Both groups of teachers had concerns with word problems (43% for CSMP and 48% for non-CSMP) and, to a lesser extent, place value. The greatest difference in responses was that CSMP teachers were much more likely to name an area of computation (basic facts, multiplication and division algorithm, and operations with decimals and fractions) and non-CSMP teachers were more likely to name mental arithmetic.

6. Prerequisites for Math Program Not Achieved

Were there any skills or concepts that your present math program assumed students would know at the beginning of the year which, in fact, many did not know? (Check as many as apply)*

| | CSMP | NON-CSMP |
|---|---|---|
| No | 0% | 26% |
| Omit | 13% | 22% |
| Yes: | (87%) | (52%) |
| basic number facts | 60% | 35% |
| place value | 23% | 22% |
| algorithm for whole number multiplication | 23% | 13% |
| algorithm for whole number division | 17% | 17% |
| operations with fractions | 50% | 0% |
| familiarity with fractions | 40% | 26% |
| operations with decimals | 60% | 4% |
| familiarity with decimals | 43% | 17% |
| mental arithmetic | 13% | 30% |
| estimation | 27% | 4% |
| word problems | 17% | 13% |
| geometry | 33% | 0% |
| probability | 30% | 9% |
| other | 12% | 0% |

*Percentages do not sum to 100 since multiple responses were possible.

COMMENTS: 87% of the CSMP teachers versus 52% of the non-CSMP teachers indicated that their math program assumed certain entering prerequisites which students did not have. Again, CSMP teachers checked a greater number of items (mean number CSMP = 3.6; non-CSMP = 1.7). Named by about half of the CSMP teachers (40% to 60%) were basic number facts and the two items each involving fractions and decimals. Geometry and probability were named by about a third of the CSMP teachers. For non-CSMP teachers the most popular responses were basic number facts and estimation, named by about a third of the teachers.

## 7. Best Aspects of Present Program

What are the best aspects of your present math program? (open-ended)*

| | CSMP | NON-CSMP |
|---|---|---|
| Promotes reasoning skills/ creative thinking | 43% | 0% |
| Challenges high ability students | 29% | 23% |
| Remedial exercises for slow students | 0% | 14% |
| Allows for different ability levels | 25% | 0% |
| Student interest/motivation | 25% | 14% |
| Attractive format | 4% | 27% |
| Variety of content | 18% | 0% |
| Spiral approach | 11% | 0% |
| Mental arithmetic | 18% | 0% |
| Good review and supplementary materials | 4% | 27% |
| Good coverage of basics for 5th grade | 0% | 23% |
| Good coverage of a particular skill or content area | 14% | 9% |
| Other | 10% | 30% |
| None | 0% | 18% |

*Percentages do not sum to 100 since multiple responses were possible.

COMMENTS: In stating the best aspects of their math program, each of the following items were alluded to by at least 25% of the CSMP teachers:

a) Promotes reasoning skills/creative thinking (43% for CSMP, 0% for non-CSMP)
b) Challenges high ability students (29% versus 23%)
c) Allows for different ability levels (25% versus 0%)
d) Student interest/motivation (25% versus 14%)

And at least 23% of the non-CSMP teachers alluded to the following items:

a) Attractive format (27% for non-CSMP, 4% for CSMP)
b) Good review and supplementary materials (27% versus 4%)
c) Challenges high ability students (23% versus 29%)
d) Good coverage of basics for 5th grade (23% vs. 0%)

In addition, between 10 and 20% of CSMP teachers alluded to variety of content, spiral approach and mental arithmetic, while these were not mentioned by any of the non-CSMP teachers. Conversely, 14% of the non-CSMP teachers alluded to remedial exercises for slow students as a "best aspect", while this was not mentioned by any of the CSMP teachers.

8. Worst Aspects of Present Program

What are the worst aspects of your present math program? (open-ended)*

| | CSMP | NON-CSMP |
|---|---|---|
| Not appropriate for low-ability students | 27% | 10% |
| Appropriate only for above-average students | 8% | 0% |
| No time allowance for work with low ability students | 12% | 0% |
| Not challenging enough/boring | 0% | 24% |
| Cannot meet needs of both high and low achievers in same class | 8% | 10% |
| Not enough work on basics | 12% | 14% |
| Not enough word problems | 12% | 10% |
| Prior knowledge assumed | 12% | 5% |
| Too time-consuming | 15% | 5% |
| Confusing presentation | 14% | 10% |
| Schedule for presenting concepts | 0% | 20% |
| Supplementary material necessary | 4% | 10% |
| Other | 33% | 28% |
| None | 0% | 10% |

*Percentages do not sum to 100 since multiple responses were possible.

COMMENTS: In stating the worst aspects of their math program, CSMP teachers were more likely to mention inappropriateness for low ability students or related problems (the first three items) while non-CSMP teachers were more likely to state that their program was not challenging enough and to dislike the schedule for the presentation of various concepts. There was quite a diversity of responses from both groups.
The relatively large percentage of responses in the "other" category reflect the many different kinds of criticism teachers offered. Some of the comments, none of which were given by more than two teachers, referred to: articulation with federal programs, length of lessons, too much to cover over the year, terminology, working with parents, and lack of follow-up materials.

9. Overall Evaluation of Math Program

Please give your overall evaluation of your math program. (open-ended)*

| | CSMP | NON-CSMP |
|---|---|---|
| Good-to-Great | 36% | 33% |
| Good with Reservations | 45% | 5% |
| (Not appropriate for low ability students) | (36%) | (5%) |
| (Needs to be supplemented) | (9%) | (0%) |
| Adequate | 14% | 29% |
| Poor | 5% | 33% |

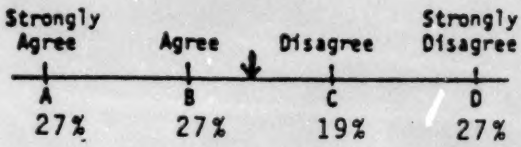
*Percentages do not sum to 100 since multiple responses were possible.

10. CSMP Teachers Only: Questions on Spiral Approach

What do you think of CSMP's spiral approach, where the teacher goes on to a new lesson in a different strand, even though not all students may have understood the last lesson?
(An arrow ("↓") has been drawn to indicate where on the scale the mean response falls, based on A = 1, ..., D = 4.)

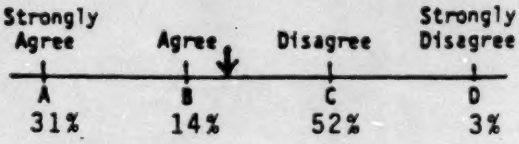
It is less frustrating for the students than a mastery approach.

$\bar{X}$=2.5



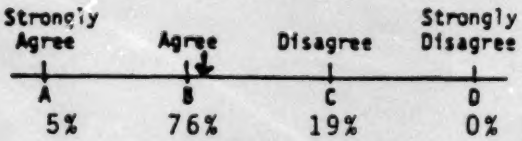

I would prefer spending 2-4 consecutive days on a new topic.

$\bar{X}$=2.3



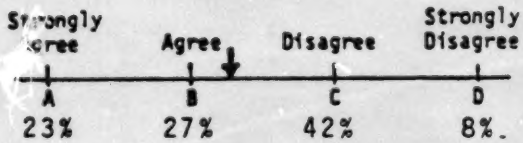

It gives the students time to really absorb a topic if they are introduced to it in small doses over a long period

$\bar{X}$=2.1



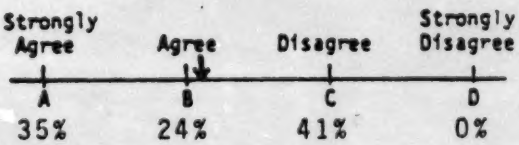

I have to repeat lessons because students don't remember.

$\bar{X}$=2.3



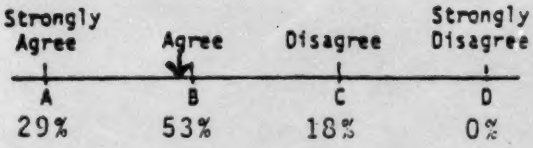

It only works for some students.
(Please specify) _____

$\bar{X}$=2.1



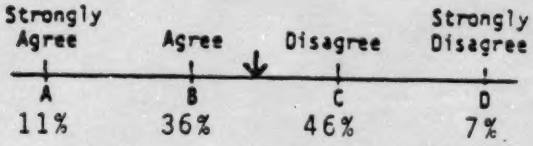
Students feel less pressured than in a mastery approach.

$\bar{X}=1.9$



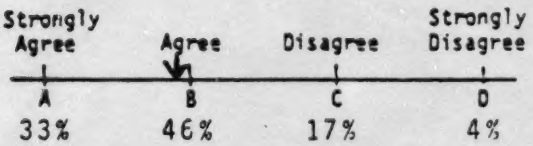

It takes too long before the class returns to a topic.

$\bar{X}=2.5$



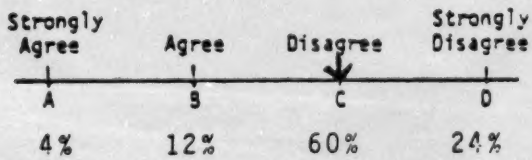

It is more interesting for the students than a mastery approach.

$\bar{X}=1.9$




Students never master content.

$\bar{X}=3.0$




COMMENTS: While the responses were fairly balanced for the most part, there were three items on which the reponses were bunched at one end of the scale; they were more likely to say: that is <u>not</u> true that students never master content and that it <u>is</u> true that the spiral approach is more interesting and makes students feel less pressured than a mastery approach.

On three other items, a minority viewpoint (25%-35%) in strong disagreement with the philosphy of the spiral approach was voiced: that the spiral approach only works for some students, that it would be better spending 2-4 consecutive days on a new topic, and that it is <u>not</u> less frustrating for the students than a mastery approach.

## 11. CSMP Teachers Only: Comparisons with Previous Years

Many questions have been asked in previous questionnaires. Below are two tables giving mean responses for repeated questionnaire items, thus providing an opportunity to compare CSMP teachers' responses as a function of grade.

In Table 1, responses were coded from 1 (least positive) to 5 (most positive), and responses in different years of the Extended Pilot Test have been combined by grade level.

Table 1

Mean Scores by Grade for Repeated Questionnaire Items (Kdg.-5th Grade)

| Grade Level | K | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| (N) | 90 | 110 | 55 | 86 | 57 | 38 |
| Student Interest and Involvement | 4.5 | 4.8 | 4.4 | 3.8 | 4.1 | 3.9 |
| *Student Overall Achievement | 4.4 | 4.3 | 4.1 | 3.1 | 3.3 | 3.3 |
| Appropriateness for low ability students | 3.0 | 2.6 | 2.9 | 2.5 | 2.6 | 2.5 |
| Students' Facility with Word Problems | | | 3.2 | 3.0 | 3.6 | 3.2 |
| Students' Logical Reasoning Ability | | | 4.2 | 3.1 | 4.4 | 4.4 |
| Overall Quality | 4.4 | 4.6 | 4.5 | 3.7 | 4.0 | 3.7 |

*This item has been asked in three different forms:

K-1: "Students' overall achievement"

2-3: "Students' overall achievement in the usual skills and concepts"

4-5: "Students' achievement in computational skills" and

"Students achievement in Mathematical Concepts"
(A mean for the two questions was used for comparison purposes in this table.)

It can be seen that K-2 teachers have generally rated the program more favorably than teachers at higher grade levels. But above the second grade, there is no clear trend. One can get a quick measure of overall rating by averaging across the six categories. The mean scores for grades 2-5 are, respectively: 3.9, 3.2, 3.7 and 3.5.

12. Summary

CSMP teachers, in comparison with non-CSMP teachers:

a) Were more likely to describe their math class as:
   - fun atmosphere (versus business-like)
   - oriented towards creative activities (versus solving specific problems)
   - a harder subject to teach (versus easier)
   - oriented towards general progress (versus basic skills)
   - following lesson plans in great detail (versus only as a general guide)

b) Were more likely to think low ability students benefit from:
   - small group instruction (versus individual)
   - touching lightly on a topic several times (versus staying for mastery)

c) Were more likely to judge their present program superior to previous programs in:
   - student interest and involvement
   - students' achievement in mathematical concepts
   - student's ability to do logical reasoning
   - appropriateness for high ability students

   and inferior to previous programs in:
   - achievement in computational programs

d) Were more likely to name as best aspects of their program:
   - promotes reasoning skills/creative thinking
   - allows for different ability levels
   - variety of content and spiral approach

   and less likely to name:
   - attractive format
   - good coverage of the basics
   - good review and supplementary materials

e) Were more likely to name as worst aspects of their program:
   - not appropriate for low ability students

   and less likely to name:
   - not challenging enough or boring
   - no schedule for presenting concepts

f) Were more likely to identify as content deficiencies:
   - computational skills - basic facts, algorithms, fraction and decimal operations

   and less likely to identify:
   - mental arithmetic

B. Relationship of Teacher Attitude Variables to Other Data

Several attitude scales were constructed from items in the teacher questionnaire:

- Agree-low ability philosphy. This scale was based on the responses to 6 items from the series of items, "preferred methods for teaching low ability students" (page 22). Higher scores indicated responses that agreed with the CSMP philosophy, for example: teacher led, heterogeneous classroom, wide variety of topics, challenging goals.

- Approve spiral approach. This scale, given to CSMP teachers only, was based on the set of 9 items dealing with the spiral approach. High scores indicated agreement with the spiral approach as embodied in CSMP.

- Math class like CSMP. Five of the items from the series of items, "characteristics of math class", composed this scale. High scores indicated that the teacher described his or her math class in a "CSMP" way, for example, oriented to general progress, lessons proceed briskly, content is challenging, there is a fun atmosphere, and there are creative activities.

- Overall evaluation of curriculum. This scale was based on the number of items checked in "content not adequately covered" and "prerequisites for math program not achieved", responses to the items in "comparison with previous math program" and a subjective rating of the teacher's open ended evaluation.

- Positive/confident about math. This scale was composed of three items: degree of math anxiety, math class is a favorite time and math is one of their easier subjects to teach (the last two from the section "characteristics of math class").

- Curriculum inappropriate for low ability students. This scale was based on two items, a comparison with the previous program used and a subjective evaluation of how frequently this shortcoming was mentioned in the free responses for "worst aspects" and "overall evaluation". A high score indicated the teacher thought the program was inappropriate.

- Curriculum inadequate for computation skills. This scale was based on how frequently computation skills were mentioned in "content not adequately covered", "prerequisites for math program not achieved", "worst aspects", as well as in the open-ended overall evaluation. In addition, the item comparing present to previous math program in developing computation skills was included.

These last two scales and "overall evaluation of curriculum" were scales in which teachers evaluated their present curriculum. The other scales were scales in which teachers agreed or disagreed with a certain way of doing things, regardless of the curriculum they were using.

Although these scales were composed almost entirely of different items, they can all be viewed as evaluative of CSMP when responded to by CSMP teachers. Indeed the first five were all positively correlated and each was negatively correlated with the last two, in which high scores indicated a negative feature of the curriculum. Most of the correlations were statistically significant.

For non-CSMP teachers however, the pattern was less clear cut. Among the three evaluative scales there was the expected relationship, significant in all cases, that low overall evaluations were associated with high "inadequacy" scores for low ability students and computation skills. But no other correlations even approached singificance. This may be because the usual textbook program does not have any particularly strong and consistent instructional philosophy; hence one could evaluate a curriculum independently of one's own instructional philosophy.

Relationship with Implementation Variables

For five of the implementation variables, there was a strong and consistent relationship between with what one might call approval of CSMP, i.e. agreement with the first 5 scales and disagreement with the last two. Teachers who thus approved CSMP:

- had more CSMP training
- supplemented the program less
- gave less homework
- played more math games, and
- made more progress in the curriculum.

The exception to this summary is that amount of homework and progress were not related to the two scales dealing with low ability students; in other words it was not true that those teachers who rated CSMP higher with respect to low ability students made more progress and assigned less homework. It is also worth noting that "positive/confident about math" did not share in any overall pattern. There were few significant relationships between teacher attitudes and the other implementation variables: amount of testing, individual help, teacher experience and length of math class.

For non-CSMP classes, there was no overall pattern between implementation variables and attitude variables, except that teachers who perceived their program as more deficient with respect to low ability students and computational skills tended to have longer math classes and give fewer tests. It is also worth pointing out that CSMP teachers whose math class was more "CSMPish" generally had higher ability classes ($r=+.46$) while similar non-CSMP teachers had lower ability classes ($r=-.21$). Also, agreement that their curriculum was inappropriate for low ability students was essentially uncorrelated with class ability level ($r=-.10$) for CSMP teachers, but was more frequently given by non-CSMP teachers with lower ability classes ($r=-.51$).

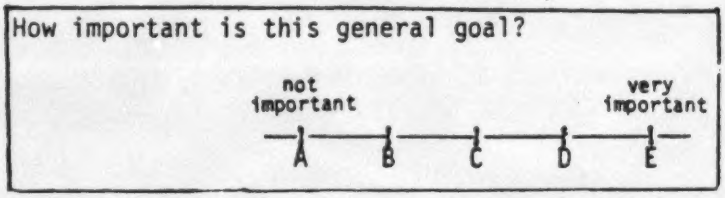
Relationship with MANS Scores

Generally weak relationships existed between teacher attitudes and MANS scores when both were adjusted for class ability level. For CSMP classes, teachers who agreed most with the CSMP philosophy, whose classes were most like CSMP and who least thought CSMP to be inappropriate for low ability students tended to get lower scores in computation! On the other hand, approval of CSMP (on all the attitude scales) was also associated with higher scores on MANS scales less oriented toward standard computation.

For non-CSMP classes, there was only the unsurprising result that more positive evaluations of the curriculum were related to higher test scores, though significance was reached only for the negative correlation between "curriculum inadequate for computational skills" and test scores in computation and mental arithmetic.

## TEACHER EVALUATION OF MANS SCALES

For each MANS test, a mean score was calculated across CSMP teachers and across non-CSMP teachers for their responses to the question:




(Responses were coded 1,..., 5 respectively. Teachers were actually presented each time with a sample of the test items and some brief directions, where thought to be necessary.)

The means across tests in a category was then calculated and the results are shown for CSMP and for non-CSMP teachers in Table 2, below. They are shown in descending order of perceived importance.

Table 2

Goals Rated in Order of Importance by Category

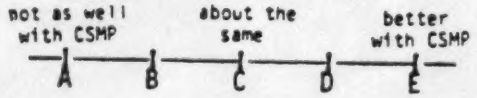
| Category of MANS Tests | Mean Rating Across Teachers | |
|---|---|---|
| | CSMP | non-CSMP |
| CTBS Computation | 4.9 | 4.8 |
| Word Problems | 4.4 | 4.65 |
| Mental Arithmetic | 4.4 | 4.3 |
| Fractions | 4.3 | 4.3 |
| Decimals | 4.35 | 4.25 |
| Organizing Data | 4.2 | 4.3 |
| Estimation | 4.1 | 3.85 |
| Elucidation | 3.7 | 3.5 |
| Number Relations | 3.5 | 3.25 |
| Probability | 3.15 | 3.1 |

It can be seen that the rank order of importance is almost identical between CSMP and non-CSMP teachers. CSMP teachers tended to rate Estimation, Elucidation and Number Relationships higher, and Word Problems lower, than non-CSMP classes. Within the category Fractions, CSMP teachers gave a half unit higher rating to Fractional Word Problems (4.6 versus 4.1), and a lower rating to Fractional Representation (4.0 versus 4.6). CSMP classes did better than non-CSMP classes on the scales rated more important by their teachers, but did not do worse on the scales rated less important.

It is also interesting to note, for both groups, the predominant place of computation as easily the most important aspect of mathematics instruction.

For CSMP teachers only, the following question was also asked for each scale, and responses coded 1, 2,.....5, in the usual way:

Will CSMP enable students to do better on this test than they would with an ordinary textbook program?




Responses are summarized below (mean of responses across each category of MANS scales) and given in descending order. For comparison purposes, the p-value of the comparison of actual test scores for these categories is also given (significant p-value always favored CSMP).

Table 3

Goals Rated in Order According to How Well CSMP Teachers Thought Students Would Do

| Category of MANS Test | Mean Across CSMP Teachers | p-value of CSMP-non-CSMP Difference in Test Results |
|---|---|---|
| Elucidation | 4.3 | .01 |
| Mental Arithmetic | 4.1 | .01 |
| Probability | 4.1 | .02 |
| Estimating Intervals | 3.5 | .01 |
| Number Relations | 3.35 | .01 |
| Decimals | 3.15 | .01 |
| Fractions | 3.1 | .03 |
| Most Reasonable Answer | 2.8 | .82 |
| Organizing Data | 2.7 | .81 |
| Word Problems | 2.6 | .03 |
| Computation | 2.4 | .42 |

On the whole, teachers did a good job of predicting the MANS results; all categories with a mean rating above 3.0 (which corresponded to a response of "about the same") produced significant results in favor of CSMP classes. The two categories on which CSMP classes did best relative to non-CSMP classes were Number Relations and Decimals, and on these scales, teacher ratings were barely above average (3.15 and 3.35).

The two categories which CSMP teachers had previously rated most important, Computation and Word Problems, were the two categories which they thought CSMP students would do least well, and definitely not as well as they would have in an ordinary textbook program. This was a serious underprediction on their part; CSMP students did better than non-CSMP classes on both categories, significantly so in Word Problems.

Though as a group CSMP teachers predicted somewhat successfully how well CSMP students would do on various MANS categories, this was not true for their individual classes. Among CSMP teachers the correlations between teachers' predictions of whether or not CSMP students would do better and whether their own class actually did better were about the same for a given category as between two different categories, i.e. low and positive.

Correlations among the various category ratings were uniformly high, both for CSMP and non-CSMP teachers. Nor was there much differential correlation with implementation and teacher attitude variables. However, certain of these variables were associated with high predictions for CSMP achievement in virtually all categories. Generally, teachers who predicted higher scores for CSMP students:

- had higher ability classes
- made more progress in the schedule
- approved of the spiral approach
- thought math class was "CSMP" in nature
- did not feel the program was inadequate for computational skills and for the low ability student

## Student Responses

A total of 29 questions were asked, each question having 3 or 4 possible responses depending on the type of question. On the next pages these questions are reproduced, together with some of the directions that preceded each of the 4 sets of items. Below each possible response to each item are given two numbers, xx, yy. These are the percent of CSMP and non-CSMP students respectively who gave that response to the item.

For some items, two other percents are given in parentheses, e.g. (xx,yy). These are the same percents from last year's fourth grade students, about 60% of whom participated in this study.

At the end of each set of items, some summary comments are given.

After this presentation of responses to individual items, various attitude scales will be defined and an analysis of class mean scores in these scales will be presented.

1. "...tell what you think about these subjects in school ... Put an x in the circle that best describes how you feel..."

A. Science

| Like | In between | Do not like |
|---|---|---|
| ○ | ○ | ○ |
| 50,47 | 39,41 | 10,12 |
| (49,53) | (42,37) | ( 9, 9) |

B. Social Studies (History)

| Like | In between | Do not like |
|---|---|---|
| ○ | ○ | ○ |
| 37,27 | 42,47 | 21,27 |
| (41,37) | (42,42) | (16,20) |

C. Mathematics

| Like | In between | Do not like |
|---|---|---|
| ○ | ○ | ○ |
| 51,58 | (33,28) | (16,14) |
| (58,57) | (29,30) | (12,12) |

D. Reading

| Like | In between | Do not like |
|---|---|---|
| ○ | ○ | ○ |
| 60,51 | 31,36 | 9,12 |
| (56,59) | (33,31) | (10, 9) |

E. Spelling

| Like | In between | Do not like |
|---|---|---|
| ○ | ○ | ○ |
| 58,51 | 29,34 | 12,14 |
| (56,62) | (34,28) | (10,10) |

F. Physical Education (P.E. or Gym)

| Like | In between | Do not like |
|---|---|---|
| ○ | ○ | ○ |
| 81,78 | 16,18 | 2, 4 |
| (83,83) | (12,12) | (4, 4) |

CSMP students liked every subject better than did non-CSMP students, except for Mathematics, where it was reversed. This is true whether one looks at "Like" or at the "Do no like" responses. Compared to last year, CSMP responses were about the same except for a decline in mathematics, while for non-CSMP students there was a decline in every subject except math.

2. "...tell how often you have done these activities this year in learning mathematics..."

A. Taken math tests

| A lot | A little | Never |
|---|---|---|
| 54,63 (34,47) | 44,36 (63,50) | 02,01 (02,02) |

B. Done math homework

| A lot | A little | Never |
|---|---|---|
| 44,60 (37,57) | 47,36 (48,34) | 08,04 (14,08) |

C. Played math games

| A lot | A little | Never |
|---|---|---|
| 38,15 (48,18) | 54,62 (46,63) | 08,22 (04,19) |

D. Gotten individual help from the teacher on your math

| A lot | A little | Never |
|---|---|---|
| 21,26 (41,40) | 69,63 (55,54) | 11,10 (04,06) |

The first 3 items were chosen from a larger set of items from 4th grade because of the differential responses. In all 3 items, the difference in responses between CSMP and non-CSMP students was decreased from last year, with CSMP students still taking tests and doing math homework less often and playing math games more often. There was again no difference in the response to getting individual help from the teacher. The direction of change from last year was always the same for CSMP and non-CSMP; fifth graders took tests and did homework more often and played games and got individual help less often than did fourth graders.

3. "...tell what you think about each of these statements..."

A. I usually understand what we are talking about in mathematics.

| True about me | Sometimes true about me | Not true about me |
|---|---|---|
| 50,49 (49,46) | 48,49 (50,51) | 02,02 (01,02) |

B. I like to tell other people about mathematics problems.

| True about me | Sometimes true about me | Not true about me |
|---|---|---|
| 25,19 | 44,45 | 31,35 |

C. Doing mathematics makes me nervous.

| True about me | Sometimes true about me | Not true about me |
|---|---|---|
| 12,09 (10,11) | 23,29 (24,28) | 64,60 (65,60) |

D. Mathematics is fun for me.

| True about me | Sometimes true about me | Not true about me |
|---|---|---|
| 40,45 (47,51 | 42,35 (39,34) | 17,18 (14,15) |

E. I'm looking forward to taking math next year.

| True about me | Sometimes true about me | Not true about me |
|---|---|---|
| 44,52 | 29,24 | 27,23 |

F. Mathematics is boring for me.

| True about me | Sometimes true about me | Not true about me |
|---|---|---|
| 16,14 (10,12) | 42,37 (38,31) | 42,48 (52,57) |

The responses were similar for CSMP and non-CSMP students, with CSMP students giving a slightly more positive (or less negative) response to items B and C; non-CSMP students for items D, E and F. Responses were very similar to last year's except that math seems to have become a little less pleasant for these 5th graders.

4. "...tell what you think about these statements..."

A. In math problems, there is only one right answer.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 15,19 | 58,59 | 21,15 | 6, 6 |

B. In doing a math problem, it helps to estimate the answer before working it out exactly.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 19,12 | 54,45 | 22,35 | 4, 8 |

C. If students could use calculators, they would be good at solving math problems.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 46,45 | 24,18 | 16,13 | 13,22 |

D. Being good at pretending helps people in math.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 7, 7 | 20,21 | 31,33 | 42,38 |

E. In a math problem, either you get it or you don't get it; it doesn't help to drop it and come back to it later.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 15,15 | 28,23 | 36,37 | 21,24 |

F. It's fun to make up new math problems.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 33,32 | 41,35 | 15,19 | 11,14 |

G. Drawing pictures or diagrams helps me solve a math problem.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 20,11 | 48,38 | 22,34 | 9,17 |

cont'd next page

H. To be good at math, you have to be good at memorizing things.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 32,34 | 42,42 | 21,20 | 4,3 |

I. At home, we talk about mathematics.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 10,10 | 24,29 | 40,41 | 25,20 |

J. When you do a math problem, there is a rule to follow.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 53,53 | 40,40 | 04,06 | 01,01 |

K. When I get stuck on a new idea in math, it's better to go on to something else and return to the new idea at another time.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 33,23 | 38,38 | 18,27 | 09,13 |

L. In real life, it's good enough to estimate the answer rather than to work it out exactly.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 10,10 | 30,34 | 38,39 | 21,16 |

M. When you do math, you do calculations.

| Always True | Usually True | Not Usually True | Never True |
|---|---|---|---|
| O | O | O | O |
| 49,52 | 39,35 | 9, 9 | 2, 4 |

Generally, the responses were similar for the two groups, with some exceptions which will become apparent in the analysis of scales which follows.

A series of attitude scales were defined by combining scores from various items which were always scored 3, 2, 1, ... for responses from left to right respectively. These scales were as follows:

A1: Math versus other subjects
Five times "Like math" minus the total of the 5 "like other subjects" from the first set of items.

A2: Self concept in mathematics
From the third set of items: (A + B + D + E) minus (C + F) + item F of the fourth set of items)

A3: Value of spiral approach
From the fourth set of items: K minus E

A4: Value of Estimation
From the fourth set of items: B + L

A5: Math is closed
From the fourth set of items: H + J

A6: Math is only calculation:
From the fourth set of items: C + M

A7: Math is open
From the fourth set of items: D + F + G

For each class a mean score for each scale was calculated, together with a mean score on the reading test. Then an analysis of covariance procedure was used, with reading as a covariate. This turned out to be a fairly ineffective procedure because of the weak relationship between class mean reading scores and scores from these various attitude scales.

The mean scores across CSMP and non-CSMP classes are given in the table 4 below, together with the p-value of resulting F-test.

Table 4

Adjusted Class Means, Attitude Scales

| Scales ("average" score)[1] | Attitude Scale Means Across Classes | | *=significant at .05 level |
|---|---|---|---|
| | CSMP | non-CSMP | |
| A1: Math versus other subjects (11.0) | 10.5 | 11.4 | * |
| A2: Self concept in mathematics (8.5) | 10.6 | 10.5 | |
| A3: Value of spiral approach (4.0) | 4.6 | 4.4 | |
| A4: Value of estimation (4.0) | 4.2 | 4.0 | |
| A5: Math is closed (5.5) | 7.4 | 7.4 | |
| A6: Math is mainly calculation (4.0) | 5.4 | 5.2 | |
| A7: Math is open (5.5) | 5.7 | 5.3 | * |

[1]Some numerical transformations of scores (such as adding constants) were made in order to avoid negative scores and to make the relationship between the number of items and the largest possible score fairly constant. In parentheses after each scale is given the average score, had students marked (or been able to mark) the middle response to each item.

It can be seen that CSMP classes liked math less, compared to other subjects, than did non-CSMP classes, but saw math as more open. It can also be seen that both groups of classes generally marked higher than average scores for (agreed more than disagreed with) statements indicating math is closed and mainly calculation.

B. Student Attitudes versus Other Data

Correlations Among Attitude Scales

Correlation coefficients were calculated across students among the various attitude scales. This was done separately for CSMP and non-CSMP students, but the correlations were virtually the same for the two groups. The only relationships of even moderate strength ($r > .20$) were between:

A2, Self concept in math - A1, Math versus other subjects (r=.48)
A2, Self concept in math - A7, Math is open (r=.45)
A4, Value of estimation - A7, Math is open (r=.28)

Correlations Between Attitude Scales (A1 and A2) and Test Scores

When computed across students, low correlations (<.20) were recorded between test scores (reading and various MANS scores) and the Attitude Scales.

When computed across classes, correlations tended to be slightly higher. Table 3 shows these correlations for A1 and A2.

Table 3

Correlations of Class Means
Attitudes versus Test Scores
x/y: x=CSMP, y=non-CSMP

| | Reading | Computation | Total MANS |
|---|---|---|---|
| A1, Math versus other subjects | .03/-.15 | .24/-.17 | .07/-.05 |
| A2, Self concept | -.30/-.26 | -.05/-.25 | -.34/-.25 |

For non-CSMP classes, the numbers are consistent as one reads across; both A1 and A2 have negative correlations with various test scores. For CSMP classes, there is a difference between Computation and the other test scores; Computation scores are always more positively (or less negatively) related to A1 and A2 than are Reading and Total MANS. But none of the correlations in Table 3 is statistically significant.

Correlations between A1 and A2 and Teacher Variables

Once again, correlations at the class level were low and usually insignificant. One interesting pattern was observed. CSMP classes tended to like math more when:

- the teacher gave a higher overall evaluation to the curriculum
- supplementing occurred more often
- fewer tests were reported by students
- fewer games were reported by students

Non-CSMP classes tended to like math less under these same conditions.